



STATE OF MAINE  
DEPARTMENT OF TRANSPORTATION  
16 STATE HOUSE STATION  
AUGUSTA, MAINE  
04333-0016

JOHN ELIAS BALDACCI  
GOVERNOR

DAVID A. COLE  
COMMISSIONER

December 12, 2006  
Subject: **Bath**  
Project No: NH-1012(300)  
Pin No: 10123.00  
**Amendment 2**

Dear Sir/Ms.:

Please make the following change to the Bid Documents:

In the Bid Book, within: "Special Provision, Section 102.12" DELETE in its entirety the third paragraph that states: "The Contractor must complete one side of the Bridge before moving to the other side for purposes of this contract one side shall be the north bound lanes or the southbound lanes." Make this change in pen and ink.

REMOVE the existing: "Section 401, HOT MIX ASPHALT PAVEMENT, (with Polymer Additive)" dated October 3, 2006 sixteen pages total and REPLACE with the attached updated: "Section 401, HOT MIX ASPHALT PAVEMENT, (with Polymer Additive)" dated December 11, 2006 seventeen pages total.

Within "Special Provision, Section 403, Hot Mix Asphalt" under "Tack Coat" in the sentence that begins: "A tack coat shall be used..." DELETE the reference to 403.324 Special Provision and REPLACE it with the following: "Section 401, Hot Mix Asphalt, (with Polymer Additive)" Make this change in pen and ink.

The following questions have been received.

**Question:** Will the utility lines directly over the northbound cantilever guide sign be relocated to complete the work?

**Response:** The utility lines will not be relocated. The proposed location for the northbound cantilever guide sign is a minimum of 10' away from the utility pole and aerial lines so that the existing overhead lines do not have to be moved.



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**Question:** Where will the 3 work zone crash cushion (item 527.43) be utilized? Or is this the item for the repairs to the existing crash cushions?

**Response:** Item 527.34 Work Zone Crash Cushion is for temporary crash cushions to protect the work zone.

**Question:** How will MDOT establish grade control for the 4 inch overlay?

**Response:** Grade control will be set using the curb reveal, then using cross slope to get back to centerline. The Contractor will have to be sure to match the existing expansion dams at whatever pitch they are at, i.e. top of armor minus 2" to allow for the pavement.

**Question:** Provide locations for items 202.121, 502.21, 502.23 and 518.50 (518.61)

**Response:** Item 202.121 Remove Existing Concrete is used to cover concrete removal at locations not covered under other items such as 202.124, 518.50, 518.51, 518.511, 518.60 and 518.61. Item 202.121 is primarily used to pay for concrete removal associated with the new joint at pier 13 below the concrete removal paid for under item 202.124.

Item 502.23 Structural Concrete Pier is used to pay for the transition wall on the Southerly pier on the High Street Bridge. See the bottom half of sheet 7 for details of the transition wall.

Item 502.21 Structural Concrete Abutment & Retaining Wall is used at the top of both abutments. See sheet 5 abutment joint detail on the lower right hand corner for details.

Locations where item 518.50 Repair of Upward Facing Surfaces -To Reinforcing Steel applies shall be as directed by the Resident.

**Question:** Please clarify optional construction joint for bridge deck placements at existing bridge joint locations.

**Response:** Spans 13 through 20 are simple spans. The superstructure slab concrete (i.e. white topping) for a simple span shall be placed continuously and shall be kept plastic until the entire span has been placed.

Continuous spans are span 1 through 3, span 3 through 6, span 7 through 9 and span 10 through 12. The superstructure slab concrete (i.e. white topping) for the continuous spans sections shall be placed in one continuous operation and the concrete shall be kept plastic one complete span behind the span being placed.

**Question:** Can a Razor Back Screed be utilized instead of Bidwall?

**Response:** Yes a Razor Back Screed can be used, because it is not the finished riding surface.

**Question:** How long of a curing period will be required before paving?

**Response:** Please refer to section 401.11 of the attached updated Special Provision Section 401 Hot Mix Asphalt Pavement (with Polymer Additive) in this amendment.

**Question:** How long does MDOT expect to take to sound deck once the initial 2" of concrete is removed?

**Response:** Sounding the deck will be done immediately behind the removal in a timely manner. The time it takes to do the sounding depends upon how much deteriorated concrete is found.

**Question:** How large of a hammer will be accepted on full depth repairs?

**Response:** A standard jackhammer should be used in full depth repair areas. If there is significant over breakage during removal, the jackhammer size will have to be limited.

**Question:** Will a sand/cement slurry be required for a bonding agent for the 4" overlay?

**Response:** Yes.

**Question:** Is item 518.51 repaired with a bag material or a modified class A mix?

**Response:** Class A concrete can be used for the concrete white topping and to fill in partial depth concrete repairs all in one operations.

**Question:** What is the detail at the surface for item 520.24 preformed joint filler?

**Response:** New ½" preformed joint filler shall be used from the finished grade down approximately 6".

**Question:** What is the load restriction once the initial 2" of concrete is removed?

**Response:** None.

**Question:** Should it be assumed that the gland seal is replaced both side of pier 13?

**Response:** Yes.

**Question:** Does the gland seal replacement at pier 13 go into the curb as shown on Standard Details 520 (02)?

**Response:** Yes.

**Question:** With all the minimum setbacks of the southbound cantilever sign structure it appears that it sets in the same location as the Burger King sign please clarify?

**Response:** The new southbound cantilever sign is not in the same location as the Burger King Sign. The Burger King sign is to remain in place. The foundation for the new southbound cantilever sign will be several feet away from the Burger King sign.

**Question:** If the resident is deciding upon location of tubular markers and safety drums, how many of each will be required?

**Response:** The exact location of the tubular markers and safety drums on sheet 11 shall be determined by the Resident. The tubular markers and drums are shown on sheet 11 in there approximate locations without the exact spacing/dimensions shown. The total number of tubular markers and drums needed on the entire project will need to be determined by the Contractor as part of the traffic control plan.

**Question:** How much of the pavement line and markings work can be completed prior to the shutdown period?

**Response:** With the approval of the Resident, the following changes can be made before full closure (i.e. "B" Portion) as follows:

- 1) High and Center/Court striping changes can be made in coordination with temporary traffic signal.
- 2) Striping changes at Washington and Center in coordination with signing changes that conflict (lane use).
- 3) Removal of existing pavement lines/markings can be done if these are re-created with temporary overlay markers.

Striping changes should be an integral part of the schedule of work paid for under item 107.51, 107.52 and 107.54.

**Question:** Please clarify SP 102.12-3rd paragraph "The Contractor must complete 1 side of the bridge before moving to the other side" Traffic control appears to close both NB& SB for deck work- why ½ at time?

**Response:** See earlier change made to "Special Provision, Section 102.12" in this amendment.

**Question:** Please confirm that maximum bid "B" is 37 days.

**Response:** The "B" portion for the work shall begin in accordance with the first paragraph of the Special Provision Section 108.9.4. If the Contractor starts the "B" portion of the work on April 17, 2007 at 7:00pm and completes the B portion by March 23, 2007 at midnight, the total "B" time is 36 days and 5 hours.

**Question:** What will be the min. cure/strength requirement for the superstructure concrete before placement of the Rosphalt 50?

**Response:** The requirements of when the pavement can be placed on top of the new concrete are in Special Provision Section 401 Hot Mix Asphalt Pavement (with Polymer Additive) section 401.11 and also in general accordance with section 502 of the standard specifications.

**Question:** Who provides the Sovereign Portable moisture meter?

**Response:** The Contractor.

**Question:** What does "shot blasting" the deck entail? We are paving guys and have never heard the term.

**Response:** The following is a general definition/explanation of shot blasting:  
Shot blasting is a method used on concrete and steel surfaces which prepares the surface for the application of a coating, paint or sealer. In order for a new coating or overlay to bond correctly to a surface, it must be clean, dry and profiled. A surface profile is needed to provide a grip or "teeth" for the coating to adhere to. The shot blast machine works by propelling steel shot at a high velocity onto a surface. This shot removes the surface layer of the concrete or steel, taking dirt, coatings, paint or other contaminants with it. A vacuum system in the machine pulls the debris into a chamber where an air wash system separates the debris from the shot. The debris is sent to the dust collector and the reusable shot is recycled.

**Question:** Since portions of the Special Provision disagree with what Royston is telling us, who has the final word on the Rosphalt 50 portion of the project

**Response:** The Resident. The current Special Provision was developed with polymer additive manufacture input. Since specific issues are not identified in this RFI, specific answers cannot be given. Please refer to Special Provision 401- Hot Mix Asphalt (with polymer additive). The specification is unchanged from previous versions with the exception of the method B testing.

**Question:** Section 403 references Special Provision 403.324. Where can we find the Provision? It also specifies method B testing for all items. Since volumetric properties are not being tested for Rosphalt, What properties make up the pay factor, and how are they weighted? Is it the intent to use method B testing on the 71 tons of 19 mm and 143 ton of 9.5 mm? Since the density requirements for the bridge deck is as specified in missing Special Provision 403.324 as well will we be cutting cores on the deck itself?

**Response:** See earlier change in this amendment to: "Special Provision, Section 403, Hot Mix Asphalt" Based on the amount of long term risk the Department will be incurring with the viaduct pavements, and the concerns of our FHWA partners, method B was specified. Cores for density on the deck are required. This has been done on several prior projects. This portion of the specification is unchanged from previous versions.

**Question:** By specification, the Rosphalt is design by the manufacturer, Royston. Royston's representative is also overseeing the deck preparation, tacking and edge sealing. The Rosphalt 50 is then mixed, placed and compacted at the direction of Royston as MDOT has specified. We wonder why the contractor is then held responsible for any failures or problems that are essential out of our control?

**Response:** The prime contractor is responsible to meet the applicable contract requirements.

Consider these changes and information prior to submitting your bid on December 13, 2006.

Sincerely,



Scott Bickford

Contracts & Specifications Engineer

SECTION 401  
HOT MIX ASPHALT PAVEMENT  
(with Polymer Additive)

The following subsections of Standard Specification 401 – Hot Mix Asphalt Pavements have been deleted in its entirety and replaced by the following:

401.01 Description. The Contractor shall furnish and place one or more courses of Hot Mix Asphalt Pavement with Polymerized additive surface, or base in accordance with the contract documents and in reasonably close conformity with the lines, grades, thicknesses, and typical cross sections shown on the plans or established by the Resident. The Department will accept this work under Quality Assurance provisions, in accordance with these specifications and the requirements of Section 106 - Quality.

401.02 Materials Materials shall meet the requirements specified in Section 700 - Materials:

Asphalt Cement	702.01
Aggregates for HMA Pavement	703.07
HMA Mixture Composition	703.09
Mineral Filler	703.15

Rosphalt 50 concentrated thermoplastic virgin polymeric material shall be as manufactured by Royston Laboratories, Inc., 128 First Street, Pittsburgh, PA 15258, telephone (412) 828-1500, or approved equal. Certification shall be furnished in accordance with subsection 106.04.

Polymer Modifier Additive 401.021 The polymer modifier additive shall be a polymer modifier packaged in 10.1kg (22.5 pound) units in meltable polyethylene bags, with a minimum of 45 pounds of polymer modifier. The meltable bags can be tossed into the pug mill without opening, and will melt to disperse the additive through the normal mixing action of the pug mill. The final blend will be in accordance with the polymer modifier manufacturer requirements and approved by the Engineer. The modifier shall be a concentrated thermoplastic virgin polymeric material that is waterproof, has a melting point of 250 degrees Fahrenheit and an embrittlement point of -34 degrees Fahrenheit.

401.03 Composition of Mixtures The Contractor shall compose the Hot Mix Asphalt Pavement with aggregate, Performance Graded Asphalt Binder (PGAB), mineral filler if required and virgin polymeric concentrate. The final job mix design will be according to the polymer modifier manufacturer's requirements and approved by the Department. HMA shall be designed and tested according to AASHTO T312 and the volumetric criteria in Table 1. The Contractor shall size, uniformly grade, and combine the aggregate fractions in proportions that provide a mixture meeting the grading requirements of the Job Mix Formula (JMF). The Contractor may use a maximum of 15% reclaimed asphalt pavement (RAP) in any base, binder, surface, or shim course. The Contractor may be allowed to use more than 15% RAP, up to a maximum of 25% RAP, in a base, binder, or shim course provided that PG 58-34 asphalt binder is used in the mixture.

The Contractor shall submit for Department approval a JMF to the Central Laboratory in Bangor for each mixture to be supplied. The Department may approve 1 active design per nominal maximum size, per traffic level, per plant, plus a 9.5mm “fine” mix @ 50 gyrations for shimming. The Department shall then have 15 calendar days in which to process a new design before approval. The JMF shall establish a single percentage of aggregate passing each required sieve size within the limits shown in Table 1. The general composition limits given in Table 1 indicate the control points of mixtures permissible under this specification. The JMF shall state the source, gradation, and percentage to be used of each portion of the aggregate and mineral filler if required. It shall also state the proposed PGAB content, the name and location of the refiner, the supplier, the source of PGAB submitted for approval, the type of PGAB modification if applicable, and the location of the terminal if applicable.

In addition, the Contractor shall provide the following information with the proposed JMF:

- Properly completed JMF indicating all mix properties (Gmm, VMA, VFB, etc.)
- Stockpile Gradation Summary
- Design Aggregate Structure Consensus Property Summary
- Design Aggregate Structure Trial Blend Gradation Plots (0.45 power chart)
- Trial Blend Test Results for at least three different asphalt contents
- Specific Gravity and temperature/viscosity charts for the PGAB to be used
- Recommended mixing and compaction temperatures from the PGAB supplier
- Material Safety Data Sheets (MSDS) For PGAB
- Asphalt Content vs. Air Voids trial blend curve
- Test report for Contractor’s Verification sample

At the time of JMF submittal, the Contractor shall identify and make available the stockpiles of all proposed aggregates at the plant site. There must be a minimum of 150 Mg [165 ton] for stone stockpiles, 75 Mg [80 ton] for sand stockpiles, and 50 Mg [55 ton] of blend sand before the Department will sample. The Department shall obtain samples for laboratory testing. The Contractor shall also make available to the Department the PGAB proposed for use in the mix in sufficient quantity to test the properties of the asphalt and to produce samples for testing of the mixture. Before the start of paving, the Contractor and the Department shall split a production sample for evaluation. The Contractor shall test its split of the sample and determine if the results meet the requirements of the Department’s written policy for mix design verification (Available at the Central Laboratory in Bangor). If the results are found to be acceptable, the Contractor will forward their results to the Department’s Lab, which will test the Department’s split of the sample. The results of the two split samples will be compared and shared between the Department and the Contractor. If the Department finds the mixture acceptable, an approved JMF will be forwarded to the Contractor and paving may commence. The first day’s production shall be monitored, and the approval may be withdrawn if the mixture exhibits undesirable characteristics such as checking, shoving or displacement. The Contractor shall be allowed to submit aim changes within 24 hours of receipt of the first Acceptance test result. Adjustments will be allowed of up to 2% on the percent passing the 2.36 mm [No. 8] sieve through the 0.075 mm [No. 200] and 3% on the percent passing the 4.75 mm [No. 4] or larger sieves. Adjustments will be allowed on the %PGAB of up to 0.2%. Adjustments will be allowed on GMM of up to 0.010. Pay factors on in-place material shall be based on the original

JMF. The revised JMF shall be used for all subsequent mix. Prior to production of the Hot Mix Asphalt Pavement with Polymerized Additive, the construction of a test strip will be required.

401.031 Test Strip A test strip shall be constructed prior to the placement of polymerized pavement on the bridge decks. The test strip will be constructed offsite, or onsite, to help establish the proper production, placement, and compaction procedures for this contract prior to full plant production.

If the test strip is to be constructed off site, the test strip shall consist of a 20 ton minimum quantity. The Contractor shall notify the Department within 48 hours prior to their intent to construct the strip. The Contractor shall provide the Department with two mix samples from the test strip produced material for mix verification. The samples shall be tested for asphalt content and gradation against the JMF and contract requirements before further production. A minimum of three cores will be sampled from the test strip, and the average density of the three is required to be above the LSL of 93.0 %. If the average density of the three cores is less than the LSL of 93.0, the test strip will be rejected and a new test strip will be required before further production. There will be no separate payment for material placed in a offsite test strip, but shall be considered incidental to the 403.324 Modified Bituminous Concrete Surface Course , 9.5 mm item.

If the test strip is to be constructed onsite, the test strip shall consist of the quantity required to construct the approach surface course on the bridge; as determined by the Resident. The Contractor shall notify the Department within 48 hours prior to their intent to construct the strip. The Department shall take three mix samples from the test strip produced material for mix verification. The samples shall be tested for asphalt content and gradation against the JMF and contract requirements before further production. A minimum of three cores will be sampled from the test strip, and the average density of the three is required to be above the LSL of 93.0%. If the average density of the three cores is less than the LSL of 93.0%., the strip will be rejected, removed in it's entirety, and a new test strip required before further production. If the test strip is constructed onsite, payment for the strip will be made under the 403.210 - 9.5mm HMA item.

Mix production will not resume unless the Department is confident material meeting the contract requirements can be produced.

401.04 Temperature Requirements After the JMF is established, the temperatures of the mixture shall conform to the following tolerances:

In the truck at the mixing plant - manufactures recommended mix temp.	± 10°C [20°F]
At the Paver – manufactures recommended compaction temp.	± 10°C [20°F]

The JMF and the mix subsequently produced shall meet the requirements of Tables 1 and Section 703.07. Under no circumstances will the Department accept HMA (unless the binder has been modified) that has been heated to temperatures exceeding the manufactures recommendations. The polymer modifier manufacturer will have a full time inspector in the

plant for the normal time it takes to produce and place the modified asphalt material, at no additional cost to the Department.

401.05 Performance Graded Asphalt Binder Unless otherwise noted in Special Provision 403 - Hot Bituminous Pavement, PGAB shall be 64-28, except that for mixtures containing greater than 15% RAP the PGAB shall be PG 58-34. The PGAB shall meet the applicable requirements of AASHTO M320 - Standard Specification for PGAB. The Contractor shall provide the Department with an approved copy of the Quality Control Plan for PGAB in accordance with AASHTO R 26-01 Certifying Suppliers of PGAB.

401.08 Hauling Equipment: Trucks for hauling Hot Mix Asphalt Pavement shall have tight, clean, and smooth metal dump bodies, which have been thinly coated with a small amount of lime solution or an approved soap solution or detergent to prevent the mixture from adhering to the bodies.

All truck dump bodies shall have a cover of canvas or other water repellent material capable of heat retention, which completely covers the mixture. The cover shall be securely fastened on the loaded truck except when unloading.

All truck bodies shall have an opening on both sides, which will accommodate a thermometer stem. The opening shall be located near the midpoint of the body, at least 300 mm [12 in] above the bed.

401.10 Rollers Rollers shall be static steel, or approved vibrator type. Rollers shall be in good mechanical condition, capable of starting and stopping smoothly, and be free from backlash when reversing direction. Rollers shall be equipped and operated in such a way as to prevent the picking up of hot mixed material by the roller surface. The use of rollers, which result in crushing of the aggregate, or in displacement of the HMA will not be permitted. Any Hot Mix Asphalt Pavement that becomes loose, broken, contaminated, shows an excess or deficiency of Performance Graded Asphalt Binder, or is in any other way defective shall be removed and replaced at no additional cost with fresh Hot Mix Asphalt Pavement, which shall be immediately compacted to conform to the adjacent area.

Full compaction is required and shall be achieved by utilizing steel double drum drive rollers used in the static mode. One roller will be required for break down, and one for finish rolling. A third roller, the same as the two being utilized to do the work, will be on the job to cover any breakdowns. The rollers' water system must be in reliable working order, and apply even water coverage to the asphalt mat. Rosphalt 50 modified pavement temperatures are higher than conventional mixes and require more water to keep the material from sticking to the steel rolls. Pneumatic rollers are not required on the Rosphalt 50 mat.

The contractor may use other compaction means in areas where the specified roller train can't access. The use of an asphalt vibratory whacker may be allowed as long as it is in good working order and the watering system works reliably. Breakdown rolling will be done immediately behind the spreading operation. The finish roller will follow breakdown and used

to remove imperfections in the mat. The rolling pattern will be straight with the paving direction, with minimal turning. The Royston representative will work with the Contractor to control the rolling pattern and the frequency of passes in required. Any changes to the paving and rolling procedures must be approved by the Resident and included in a modified QCP.

If methods of compaction other than the conventional the rolling train is required, additional manpower shall be provided by the Contractor to ensure that the areas not accessible by rollers is compacted before the material cools below breakdown compaction temperatures. Areas found to be deficient due to lack of observed compactive effort, or tested to be below the minimum density requirement, will be corrected in accordance with this Special Provision's Section, 401.20 – Acceptance: Correction of Deficiencies.

A representative of the polymer modifier manufacturer shall be present at all times during the placement of the modified asphalt material and compaction operations, at no additional cost to the Department.

The type of rollers to be used and their relative position in the compaction sequence shall generally be the Contractor's option, provided specification densities are attained and with the following requirements:

- a. Vibratory rollers shall not be operated in the vibratory mode when checking or cracking of the mat occurs, or on bridge decks.
- b. Any method, which results in cracking or checking of the mat, will be discontinued and corrective action taken.

The maximum operating speed for a steel wheel roller shall not exceed the manufacturer's recommendations, a copy of which shall be available if requested.

401.101 Surface Tolerances The Department will check surface tolerance with a 4.9 m [16 ft] straightedge or string line placed parallel to the centerline of pavement and with a 3 m [10 ft] straightedge or string line placed transverse to the centerline of pavement. The Contractor shall correct variations exceeding 6 mm [¼ in] by removing defective work and replacing it with new material as directed by the Department. The Contractor shall furnish a 3 m [10 ft] straightedge for the Departments use.

401.11 Preparation of Existing Surface (Deck Preparation) Following any required deck patching and prior to placement of the Polymer Modified Asphalt, the concrete deck shall be prepared as follows:

The work under this Item shall consist of cleaning the surface of the concrete deck to remove any milled material or debris which would reduce or prevent bonding, furnishing and applying Edge Sealer, Tack Coat, furnishing and placing on the cleaned and tack coated bridge deck, an impermeable hot-mix waterproofing asphalt course to the lines, grades, width and depth as indicated on the plans, and saw cutting and filling any construction joints with rubberized joint sealer, all in accordance with the specifications and as directed by the Engineer.

Rosphalt 50 shall not be placed until the moisture content of the surface it is to be placed on is at or below 6%. The moisture content will be checked with a "Sovereign Potable Electronic Moisture master" meter or an approved equal. The moisture content shall be checked in a minimum of one location in each span. Rosphalt 50 shall not be placed until the new concrete has been in place a minimum of 7 days. The entire deck shall be shot blasted to achieve an anchor profile which is clean of foreign materials, such as oil or grease, and any sharp protrusions removed and free of laitance. The Contractor shall have a copy of Technical Guideline No. 03732 (Guideline for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays) published by the International Concrete Repair Institute. The final concrete surface profile shall range between a CSP 1 and CSP 5 as defined by this guideline. Areas where rapid setting patching materials have been placed shall be cured for a minimum of 72 hours or longer when recommended by the product manufacturer prior to applying the Rosphalt 50. All surfaces shall then be swept and cleaned by brooms and compressed air as directed by the Resident before Rosphalt 50 is placed.

The deck must be clean and free of any loose debris and moisture. A 100-150 mm (4-6 inch) application of Polymer Modifier Manufacturer Edge Sealer, at a rate specified by the manufacturer, shall be used to seal all edges of the planned day's placement of the Asphalt Waterproofing Course. Particular attention shall be given to vertical edges of headers, drains, scuppers, expansion joints or wherever compaction may be difficult to achieve. Where vertical edges exist, apply Edge Sealer 100-150 mm (4-6 inch) out from curb scuppers, joints, etc., on the horizontal and up to the top of the proposed finished surface grade. When practical, this should be done the day before or as early as possible to maximize drying time.

Polymer Modifier Manufacturer Tack Coat shall be applied to the existing horizontal concrete bridge deck surfaces in a uniform coating at the rate specified by the polymer modifier manufacturer. The polymer modifier manufacturer will oversee the Tack Coat application.

Butt joints made during paving operations must have Edge Sealer applied to the butt surface before the joining asphalt lift. The polymer modifier manufacturer will oversee the applications of Edge Sealer, wherever it is used. Construction joints shall be saw cut to a 12.7 mm (½ inch) width and filled to within 3 mm (1/8 inch) of the surface with the rubberized asphalt joint sealer previously specified. Extreme care shall be taken so as not to overfill these sawed joints since excess joint sealer material will cause ripples in the surface course necessitating corrective work by the Contractor.

Edge Sealer shall be applied to all terminations of the paved asphalt, including curb lines and deck joints, as soon as possible after the pavement has cooled.

The Contractor shall thoroughly clean the surface upon which Hot Mix Asphalt Pavement is to be placed of all objectionable material

401.12 Hot Mix Asphalt Documentation The Contractor and the Department shall agree on the amount of Hot Mix Asphalt Pavement that has been placed each day.

401.13 Preparation of Aggregates The Contractor shall dry and heat the aggregates for the HMA to the required temperature. The Contractor shall properly adjust flames to avoid physical damage to the aggregate and to avoid depositing soot on the aggregate.

401.14 Mixing The Contractor shall combine the dried aggregate in the mixer in the amount of each fraction of aggregate required to meet the JMF. The Contractor shall measure the amount of PGAB and introduce it into the mixer in the amount specified by the JMF.

The Contractor shall produce the HMA at the temperature established by the JMF.

The Contractor shall dry the aggregate sufficiently so that the HMA will not flush, foam excessively, or displace excessively under the action of the rollers. The Contractor shall introduce the aggregate into the mixer at a temperature of not more than 14°C [25°F] above the temperature at which the viscosity of the PGAB being used is 0.150 Pa·s [0.1008 Lbm/sec·ft].

The Contractor shall store and introduce into the mixer the Performance Graded Asphalt Binder at a uniformly maintained temperature at which the viscosity of the PGAB is between 0.150 Pa·s [0.1008 Lbm/sec·ft] and 0.300 Pa·s [0.2016 Lbm/sec·ft]. The aggregate shall be coated completely and uniformly with a thorough distribution of the PGAB. The Contractor shall determine the wet mixing time for each plant and for each type of aggregate used.

401.15 Spreading and Finishing On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impracticable, the Contractor shall spread, rake, and lute the HMA with hand tools to provide the required compacted thickness.

On roads opened to two-way traffic, the Contractor shall place each course over the full width of the traveled way section being paved that day, unless otherwise noted by the Department in Section 403 - Hot Bituminous Pavement.

All pavements shall be placed on surfaces that have been tack coated, if required, and allowed to cure for a minimum period of 40 minutes. A Polymer Modifier Manufacturer tack coat shall be applied to the existing concrete deck, and to the first layer of pavement in accordance with the manufacturer's recommendations if required. The film thickness of the tack coat shall be 0.04 to 0.15 gallons per square yard. The tack coat shall be allowed to break or dry prior to placement of the modified bituminous concrete. A tack coat is not required between the pavement layers if the base and surface layers of pavement are placed the same working day, or unless the base layer surface becomes contaminated with materials that would reduce bond between layers. The material shall be placed at a temperature between 375° F to 390°F.

401.16 Compaction Immediately after the Hot Mix Asphalt Pavement has been spread, struck off, and any surface irregularities adjusted, the Contractor shall thoroughly and uniformly compact the HMA by rolling.

The Contractor shall roll the surface when the mixture is in the proper condition and when the rolling does not cause undue displacement, cracking, or shoving. The Contractor shall

prevent adhesion of the HMA to the rollers or vibrating compactors without the use of fuel oil or other petroleum based release agents.

The Contractor shall immediately correct any displacement occurring as a result of the reversing of the direction of a roller or from other causes to the satisfaction of the Department. Any operation that results in breakdown of the aggregate shall be discontinued. Any new pavement that shows obvious cracking, checking, or displacement shall be removed and replaced for the full lane width as directed by the Resident at no cost to the Department.

Along forms, curbs, headers, walls, and other places not accessible to the rollers, the Contractor shall thoroughly compact the HMA with mechanical vibrating compactors. The Contractor shall only use hand tamping in areas inaccessible to all other compaction equipment. On depressed areas, the Contractor may use a trench roller or cleated compression strips under a roller to transmit compression to the depressed area. If methods of compaction other than the conventional the rolling train is required, additional manpower shall be provided by the Contractor to ensure that the areas not accessible by rollers is compacted before the material cools below breakdown compaction temperatures. Areas found to be deficient due to lack of observed compactive effort, or tested to be below the minimum density requirement, will be corrected in accordance with this Special Provision's Section, 401.20 – Acceptance: Correction of Deficiencies.

Any HMA that becomes unacceptable due to cooling, cracking, checking, segregation or deformation as a result of an interruption in mix delivery shall be removed and replaced, with material that meets contract specifications at no cost to the Department.

401.17 Joints The Contractor shall construct wearing course transverse joints in such a manner that minimum tolerances shown in Section 401.101 - Surface Tolerances are met when measured with a straightedge.

The paver shall always maintain a uniform head of HMA during the joint construction. The HMA shall be free of segregation and meet temperature requirements. Transverse joints of the wearing course shall be straight and neatly trimmed. The Contractor may form a vertical face exposing the full depth of the course by inserting a header, by breaking the bond with the underlying course, or by cutting back with hand tools.

Longitudinal joints shall be constructed in a manner that will best ensure joint integrity. Methods or activities that prove detrimental to the construction of sound longitudinal joints will be discontinued.

The edges of the pavement shall be sealed by applying Royston 120-29 curb sealer on all vertical faces which will be in contact with the rubberized asphalt paving mix. The material shall be applied so the entire edge of the layer, and a few inches onto the deck surface, is coated.

A Polymer Modifier Manufacturer tack coat shall be applied to the existing concrete deck, and the first layer of pavement in accordance with the manufacturer's recommendations. The film thickness of the tack coat shall be 0.04 to 0.15 gallons per square yard. The tack coat shall be

allowed to break or dry prior to placement of the modified bituminous concrete. A tack coat is not required between the pavement layers if the base and surface layers of pavement are placed the same working day, or unless the base layer surface becomes contaminated with materials that would reduce bond between layers.

The Contractor shall use an approved spray apparatus designed for covering a narrow surface. The Department may approve application by a brush for small surfaces, or in the event of a malfunction of the spray apparatus, but for a period of not more than one working day.

Where pavement under this contract joins an existing pavement or when the Department directs, the Contractor shall cut the existing pavement along a smooth line, producing a neat, even, vertical joint. The Department will not permit broken or raveled edges. The cost of all work necessary for the preparation of joints is incidental to related contract pay items.

401.18 Quality Control Method B or C - The Contractor shall operate in accordance with the approved Quality Control Plan (QCP) to assure a product meeting the contract requirements. The QCP shall meet the requirements of Section 106.6 - Acceptance and this Section. The Contractor shall not begin paving operations until the Department approves the QCP in writing.

Prior to placing any mix, the Department and the Contractor shall hold a Pre-paving conference to discuss the paving schedule, source of mix, type and amount of equipment to be used, sequence of paving pattern, rate of mix supply, random sampling, project lots and sublots and traffic control. A copy of the QC random numbers to be used on the project shall be provided to The Resident. The Departments' random numbers for Acceptance testing shall be generated and on file with the Resident and the Project Manager. All field and plant supervisors including the responsible onsite paving supervisor shall attend this meeting.

The QCP shall address any items that affect the quality of the Hot Mix Asphalt Pavement including, but not limited to, the following:

- a. JMF(s)
- b. Hot mix asphalt plant details
- c. Stockpile Management (to include provisions for a minimum 2 day stockpile)
- d. Make and type of paver(s)
- e. Make and type of rollers including weight, weight per inch of steel wheels.
- f. Name of QCP Administrator, and certification number
- g. Name of Process Control Technician(s) and certification number(s)
- h. Name of Quality Control Technicians(s) and certification number(s)
- i. Mixing and additive blending procedure, and material transportation, including process for ensuring that truck bodies are clean and free of debris or contamination, and plan to ensure that all truck canvases are securely tied down for maximum heat retention.
- j. Testing Plan

- k. Laydown operations including longitudinal joint construction, procedures for avoiding paving in inclement weather, type of release agent to be used on trucks tools and rollers, compaction of shoulders, tacking of all joints, methods to ensure that segregation is minimized, procedures to determine the maximum rolling and paving speeds based on best engineering practices as well as past experience in achieving the best possible smoothness of the pavement, and method of material compaction in areas inaccessible to the standard rolling train.
- l. Examples of Quality Control forms including a daily plant report and a daily paving report
- m. Silo management and details (can show storage for use on project of up to 36 hours)
- n. Provisions for varying mix temperature due to extraordinary conditions
- o. Name and responsibilities of the Responsible onsite Paving Supervisor, and the name and responsibilities of the polymer modifier manufacturer representatives.
- p. Method for calibration/verification of Density Gauge
- q. A note that all testing will be done in accordance with AASHTO and MDOT/ACM procedures
- r. A note detailing conditions under which the percent of RAP will vary from that specified on the JMF.

The QCP shall include the following technicians together with these minimum requirements:

a. QCP Administrator - A qualified individual shall administer the QCP. The QCP Administrator must be a full-time employee of or a consultant engaged by the Contractor or paving subcontractor. The QCP Administrator shall have full authority to institute any and all actions necessary for the successful operation of the QCP. The QCP Administrator (or its designee in the QCP Administrator's absence) shall be available to communicate with the Department at all times. The QCP Administrator shall be certified as a Plant Technician or Paving Inspector certified by the New England Transportation Technician Certification Program (NETTCP).

b. Process Control Technician(s) (PCT) shall utilize test results and other quality control practices to assure the quality of aggregates and other mix components and control proportioning to meet the JMF(s). The PCT shall inspect all equipment used in mixing to assure it is operating properly and that mixing conforms to the mix design(s) and other Contract requirements. The QCP shall detail how these duties and responsibilities are to be accomplished and documented, and whether more than one PCT is required. The Plan shall include the criteria to be utilized by the PCT to correct or reject unsatisfactory materials. The PCT shall be certified as a Plant Technician by the NETTCP.

c. Quality Control Technician(s) (QCT) shall perform and utilize quality control tests at the job site to assure that delivered materials meet the requirements of the JMF(s). The QCT shall inspect all equipment utilized in transporting, laydown, and compacting to assure it is operating properly and that all laydown and compaction conform to the Contract requirements. The QCP shall detail how these duties and responsibilities are to be accomplished and documented, and whether more than one QCT is required. The QCP shall

include the criteria utilized by the QCT to correct or reject unsatisfactory materials. The QCT shall be certified as a Paving Inspector by the NETTCP.

The QCP shall detail the coordination of the activities of the Plan Administrator, the PCT and the QCT. The Project Superintendent shall be named in the QCP, and the responsibilities for successful implementation of the QCP shall be outlined.

The Contractor shall sample, test, and evaluate Hot Mix Asphalt Pavement in accordance with the following minimum frequencies:

TABLE 2 : MINIMUM QUALITY CONTROL FREQUENCIES

Test or Action	Frequency	Test Method
Temperature of mix	6 per day at street and plant	-
Temperature of mat	4 per day	-
%TMD (Surface)	1 per 125 Mg [135 ton] (As noted in QC Plan)	ASTM D2950
%TMD (Base)	1 per 250 Mg [275 ton] (As noted in QC Plan)	AASHTO T269
Fines / Effective Binder	1 per 500 Mg [550 ton]	AASHTO T 312
Gradation	1 per 500 Mg [550 ton]	AASHTO T30
PG0 content	1 per 500 Mg [550 ton]	AASHTO T164 or T308
241ds at N <sub>design</sub>	1 per 500 Mg [550 ton]	AASHTO T 312
Voids in Mineral Aggregate at N <sub>design</sub>	1 per 500 Mg [550 ton]	AASHTO T 312
Rice Specific Gravity	1 per 500 Mg [550 ton]	AASHTO T209
Coarse Aggregate Angularity	1 per 6000 Mg [6600 ton]	ASTM D5821
Flat and Elongated Particles	1 Per 6000 Mg [6600 ton]	ASTM D4791
Fine Aggregate Angularity	1 Per 6000 Mg [6600 ton]	AASHTO T304

The Contractor may utilize innovative equipment or techniques not addressed by the Contract documents to produce or monitor the production of the mix, subject to approval by the Department.

The Contractor shall submit all Hot Mix Asphalt Pavement plant test reports, inspection reports and updated pay factors in writing, signed by the appropriate technician and present them to the Department by 1:00 P.M. on the next working day, except when otherwise noted in the QCP due to local restrictions. The Contractor shall also retain splits of the previous 5 QC tests, with QC results enclosed for random selection and testing by The Department during QA inspections of the HMA production facility. Test results of splits that do not meet the Dispute Resolution Variance Limits in Table 9 shall trigger an investigation by the MDOT Independent Assurance Unit, and may result in that lab losing NETTCP certification and the ability to request a dispute [Section 401.223 - Process for Dispute Resolution (Methods A and B only)].

The Contractor shall make density test results, including randomly sampled densities, available to the Department onsite. Summaries of each day's results, including a daily paving report, shall be recorded and signed by the QCT and presented to the Department by 1:00 p.m. the next working day.

The Contractor shall have a testing lab at the plant site, equipped with all testing equipment necessary to complete the tests in Table 2. The Contractor shall locate an approved SHRP Gyratory Compactor at the plant testing lab or within 30 minutes of the plant site.

The Contractor shall fill all holes in the pavement resulting from cutting cores by the Contractor or the Department with an acceptable mixture no later than the following working day. Before filling, the Contractor shall carefully clean the holes and apply a coating of Royston 120-29 curb sealer. On surface courses, cores shall not be cut except for Quality Assurance.

Contractor shall monitor plant production using running average of three control charts as specified in Section 106 - Quality. Control limits shall be as noted in Table 3 below.

TABLE 3: Control Limits

Property	UCL and LCL
Passing 4.75 mm [#4] and Nominal Max sieves	Target +/-4.0
Passing 2.36 mm [#8] sieve	Target +/-2.5
Passing .075 mm [#200] sieve	Target +/-1.2
PGAB Content*	Target +/-0.2
Voids in the Mineral Aggregate	JMF Target +/-0.9
% Voids at $N_{design}$	JMF Target +/-0.9

\*Based on AASHTO T 308

The Contractor shall cease paving operations whenever one of the following occurs on a lot in progress:

- The Pay Factor for VMA, Voids @  $N_d$ , Percent PGAB, composite gradation, VFB, fines to effective binder or density using all Acceptance or all Quality Control tests for the current lot is less than 0.85.
- The Coarse Aggregate Angularity or Fine Aggregate Angularity value falls below the requirements of Table 3: Aggregate Consensus Properties Criteria for the design traffic level.
- Each of the first 2 control tests for the lot fall outside the upper or lower limits for VMA, Voids @  $N_d$ , or Percent PGAB. This includes any case where both tests are out on the same, or different properties.
- The Flat and Elongated Particles value exceeds 10% by ASTM D4791.

- e. There is any visible damage to the aggregate due to over-densification other than on variable depth shim courses.
- f. The Contractor fails to follow the approved QCP.
- g. The Contractors control chart shows the process to be out of control on any property listed in Table 3: Control Limits.

Paving operations shall not resume until the Contractor and the Department determines that material meeting the Contract requirements will be produced. The Department will consider corrective action acceptable if the pay factor for the failing property increases, based on samples already in transit, or a verification sample is tested and the property falls within the upper and lower specification limits.

The Department retains the exclusive right, with the exception of the first day's production of a new JMF, to determine whether the resumption of production involves a significant change to the production process. If the Department so determines, then the current lot will be terminated, a pay factor established, and a new lot will begin.

The Resident shall be afforded access to the plant and equipment to review and verify certifications of material conformance and quality. If finding the Contractor failed to perform Quality Control or the submission of an incorrect certification, it shall constitute grounds for total rejection of the involved paving and/or other action as may be indicated by the finding.

The Resident may at any time, notwithstanding previous sampling and certification, notify and stop the Contractor, reject and require the Contractor to dispose of any batch of bituminous mix which is rendered unfit for use due to temperature, oxidation, contamination, segregation or incomplete coating of aggregate. Such rejection may be based on visual inspection alone.

#### 401.20 Acceptance – Method B or C

Pavement Density The Department will measure pavement density using core samples tested according to AASHTO T-166. The Department will randomly determine core locations. The Contractor shall cut 150 mm [6 in] diameter cores at no additional cost to the Department by the end of the working day following the day the pavement is placed, and immediately give them to the Department. The cores will be placed in a transport container provided by the Department and transported by the Contractor to the designated MDOT Lab as directed by the Department. Pre-testing of the cores will not be allowed. At the time of sampling, the Contractor and the Department shall mutually determine if a core is damaged. If it is determined that the core(s) is damaged, the Contractor shall cut new core(s) at the same offset and within 1 m [3 ft] of the initial sample. At the time the core is cut, the Contractor and the Department will mutually determine if saw cutting of the core is needed, and will mark the core at the point where sawing is needed. The core may be saw cut by the Contractor in the Department's presence onsite, or in an MDOT Lab by The Department, without disturbing the layer being tested to remove lower layers of Hot Mix Asphalt

Pavement, gravel, or RAP. No recuts are allowed at a test location after the core has been tested. Upon conclusion of each lot, density results shall be examined for statistical outliers as stated in Section 106.7.2.

TABLE 6: METHOD B or C DENSITY ACCEPTANCE LIMITS  
75 Gyration or more Design

	TARGET	LSL	USL
Percent of Maximum Theoretical Density	96.0	93.0	99.0

Cores for acceptance testing shall be cut such that the nearest edge is never within 0.225 m [9 in] of any joint.

There shall be no bonus for density on shoulders unless otherwise noted in Section 403 - Hot Bituminous Pavement. Density for shoulders shall be obtained by the same rolling train and methods as used on mainline travelway, unless otherwise directed by the Department. Efforts to obtain optimum compaction will not be waived by the Department unless it is apparent during construction that local conditions make densification to this point detrimental to the finished pavement surface course.

401.202 Method B Note: Paragraphs c., d., and e. from Standard Specification section 401.201 - Method A, also apply to Method B, except that Table 5: Method A Acceptance Limits is replaced by Table 7: Method B and C Acceptance Limits and the results will not be examined for outliers.

This method utilizes Quality Level Analysis and pay factor specifications. Aggregates and mix shall meet the gradation ranges and Volumetric Properties in Table 7: Method B and C Acceptance Limits, utilizing the testing methods and sampling procedures in Table 4: Acceptance Criteria.

Density testing: Unless waived in Section 403 - Hot Bituminous Pavement, density shall be tested by cutting three 150 mm [6 in] diameter cores at random locations. The cores will be tested and statistically evaluated for pay factors as described in Section 106.7 - Quality Level Analysis, using the density requirements listed in Table 7: Method B and C Acceptance Limits. The Department will pay the Contractor the price calculated as described in Section 401.22 - Basis of Payment.

PGAB Content, Gradation, and Volumetric properties testing: Unless waived in Section 403 - Hot Bituminous Pavement, the Department shall take three random samples. The samples will be tested and statistically evaluated for pay factors as described in Section 106.7 - Quality Level Analysis, using the specification limits shown in Table 7: Method B and C Acceptance Limits. The Department will pay the Contractor the price calculated as described in Section 401.22 - Basis of Payment.

TABLE 7: METHOD B AND C ACCEPTANCE LIMITS

Property	USL and LSL	
	Method B	Method C
Percent Passing 4.75 mm [No. 4] and larger sieves	Target +/-7	Target +/-7
Percent Passing 2.36 mm [No. 8] to 1.18 mm [No. 16] sieves	Target +/-5	Target +/-5
Percent Passing 0.60 mm [No. 30]	Target +/-4	Target +/-4
Percent Passing 0.30 mm [No. 50] to 0.075 mm [No. 200] sieve	Target +/-3	Target +/-3
PGAB Content	Target +/-0.5	Target +/-0.5
Air Voids	Not Applicable	Not Applicable
Fines to Effective Binder	Not Applicable	Not Applicable
Voids in the Mineral Aggregate	Not Applicable	Not Applicable
Voids Filled with Binder	Not Applicable	Not Applicable
In-place Density	93.0 to 99.0	93.0 to 99.0

This method will require volumetric testing by the Contractor. The pay factor will be based on gradation and asphalt content weighted as follows. Volumetric properties will continue to be monitored by MDOT but only for shutdown and possible design revocation.

Density (When required)	50%
PGAB	25%
Nom. Max. sieve	5%
2.36 mm	5%
0.30 mm	5%
0.075 mm	10%

401.203 Method C Note: Paragraphs c., d., and e. from Standard Specification section 401.201 - Method A, also apply to Method C, except that Table 5: Method A Acceptance Limits is replaced by Table 7: Method B and C Acceptance Limits and the results will not be examined for outliers.

7For hot mix asphalt items designated as Method C in Section 403 - Hot Bituminous Pavement, one sample will be taken from the paver hopper or the truck body per 250 Mg [275 ton] per pay item. The mix will be tested for gradation and PGAB content. Disputes will not be allowed. If the mix is within the tolerances listed in Table 7: Method B and C Acceptance Limits, Method C the Department will pay the contract unit price. If the test results for each

250 Mg [275 ton] increment are outside these limits, the following deductions (Table 7b) shall apply to the HMA quantity represented by the test. A second consecutive failing test shall result in cessation of production.

TABLE 7b

PGAB Content	-5%
2.36 mm [#8] sieve	-2%
0.30 mm [#50] sieve	-1%
0.075 mm [#200] sieve	-2%
Density	-10%

Correction of Deficiencies In the event of any portions of pavement fails to comply with specified quality requirements, the Contractor shall replace or repair deficient pavements as directed by the Resident. Corrections shall be made as work progresses and not reserved for a separate operation at some later date.

1. For minus thickness deficiencies, the only acceptable repair methods are removal and replacement, or placement of an overlay layer. Corrective work shall begin and end at the repair, and feather edging will not be permitted.
2. Where more than 6 mm (¼ inch) above the required grade, correct deficiency by removal as necessary to comply with the specifications, except where an approved contour pattern satisfying riding quality and drainage as shown on the Contract Drawings has been established.
3. For deficiency in smoothness tolerance, correct any deficiency by means approved by the Resident and subject to all other provisions hereof. The area for4 correction of deficiencies in surface smoothness and surface grade tolerance shall be those areas, which fail to satisfy quality requirements. Existing pavement shall be removed as necessary to provide square joints for the full depth of the course.
4. For deficiency of in-place voids, remove and replace deficient pavement in accordance with all requirements specified herein. The area replaced for deficiency of in-place voids shall be the total area paved with-in the deficient paving lot. Existing pavement shall be removed as necessary to provide square joints for the full depth of the course.
5. For deficiency involving a porous surface in the mat at longitudinal joints, or at construction joints, the surface shall be sealed with an asphalt filler/sealer material submitted to and approved by the Resident.

Method of Measurement. Modified Bituminous Concrete Surface Course will be measured by the ton, complete and in place.

Basis of Payment. Modified Bituminous Concrete Surface Course (HMA) will be paid for at the contract unit price per ton. Such payment shall be full compensation for obtaining and furnishing all aggregate, additives, and bituminous material including tack and edge sealer, for processing, heating, mixing, weighing, trucking, placing, and rolling; for furnishing the test strip, all labor, equipment, tools and all incidentals necessary to complete the work. Price adjustments will be made in accordance to the designated testing method.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
403.324 Modified Bituminous Concrete Surface Course , 9.5 mm	Ton